Name: _____

This review sheet is not comprehensive. Be sure to study your notes, homework assignments, and old tests as well!

1) What is the sum of the roots of the equation $3x^2 = 9x + 1$?

A) 9 B) $\frac{1}{3}$ C) -3 D) 3

$-9x-1$

$3x^2 - 9x - 1 = 0$

$a = 3$, $b = -9$, $c = -1$

$\text{sum} = -\frac{b}{a} = -\frac{(-9)}{3} = \frac{9}{3} = 3$

2) What are the sum (S) and product (P) of the roots of the equation $3x^2 - 7x + 12 = 0$?

A) ~~$S = 7, P = 12$~~ B) ~~$S = -\frac{7}{3}, P = 4$~~ C) $S = \frac{7}{3}, P = 4$ D) $S = \frac{7}{3}, P = -4$

$a = 3$, $b = -7$, $c = 12$

$\text{sum} = \frac{-(-7)}{3} = \frac{7}{3}$

$\text{prod} = \frac{c}{a} = \frac{12}{3} = 4$

3) Find the sum of the roots and the product of the roots of the given quadratic equation.

$3z^2 + 2 = 7z$

$-7z \quad -7z$

$3z^2 - 7z + 2 = 0$

$a = 3$, $b = -7$, $c = 2$

$\text{Sum} = -\frac{b}{a} = -\frac{(-7)}{3} = \frac{7}{3}$

$\text{product} = \frac{c}{a} = \frac{2}{3}$

4) If one root of the equation $x^2 + 3x + k = 0$ is 4, find the other root.

r_1

Have:

$a = 1$, $b = 3$

$\text{sum} = -\frac{b}{a} = -\frac{3}{1} = -3$ sum

$\text{Sum} = r_1 + r_2$

$-3 = 4 + r_2$

$-4 \quad -4$

$-7 = r_2$

other root = -7

5) If one root of the equation $x^2 + bx + 12 = 0$ is ~~-4, find~~ 5, find the other root.

Have

$a = 1$, $c = 12$

Then I can find the product

$\text{product} = \frac{c}{a} = \frac{12}{1} = 12$

$\text{product} = (r_1)(r_2)$

$\frac{12}{-4} = \frac{-4(r_2)}{-4}$

other root = -3

6) The roots of the equation $3x^2 = 5x + 4$ are
A) real, irrational, and unequal
B) real, rational, and unequal
C) real, rational, and equal
D) imaginary

Discriminant $= b^2 - 4ac$

$-3x^2 = 5x + 4$

$+3x^2 \quad +3x^2$

$0 = 3x^2 + 5x + 4$

$a \quad b \quad c$

$5^2 - 4(3)(4)$

$25 - 48$

-23 ← imaginary because it's negative.

7) If the discriminant of an equation is 10, then the roots are
A) imaginary
B) real, rational, and equal
C) real, irrational, and unequal
D) real, rational, and unequal

positive → real
not perfect → irrational

8) The roots of the equation $ax^2 + 4x + 2 = 0$ are real and equal when a is equal to
A) 1
B) 2
C) 3
D) 4

$a \quad b \quad c$

discriminant $= 0$

$b^2 - 4ac = 0$

$4^2 - 4(a)(2) = 0$

$16 - 8a = 0$

$+8a \quad +8a$

$\frac{16}{8} = \frac{8a}{8}$

$a = 2$

9) Find the discriminant: $2y^2 + 3y + 2 = 0$

$b^2 - 4ac$

$a = 2$

$b = 3$

$c = 2$

$3^2 - 4(2)(2)$

$9 - 16$

-7

10) If the roots of $ax^2 + bx + c = 0$ are real, rational, and equal, what is true about the graph of the function $y = ax^2 + bx + c$?
A) ~~It is tangent to the x-axis.~~
B) It lies entirely below the x-axis.
C) It intersects the x-axis in two distinct points.
D) It lies entirely above the x-axis.

11) Which equation has the complex number $4 - 3i$ as a root?
A) $x^2 - 8x + 25 = 0$
B) $x^2 + 8x - 25 = 0$
C) $x^2 - 6x + 25 = 0$
D) $x^2 + 6x - 25 = 0$

$4+3i$ other

sum $= (4-3i) + (4+3i) = 8$

product $= (4-3i)(4+3i) = 25$ (calculator)

$x^2 - (\text{sum})x + (\text{prod}) = 0$

$x^2 - 8x + 25 = 0$

12) Write an equation in the form $ax^2 + bx + c = 0$ if the sum of the roots is $-\frac{1}{2}$ and the product of the roots is $\frac{1}{4}$

sum $= \left(-\frac{1}{2}\right) + \left(\frac{1}{4}\right) = -\frac{1}{4}$

prod $= \left(-\frac{1}{2}\right)\left(\frac{1}{4}\right) = -\frac{1}{8}$

$x^2 - \left(\frac{-1}{4}\right)x + \left(\frac{-1}{8}\right) = 0$

$x^2 + \frac{1}{4}x - \frac{1}{8} = 0$

13) If the roots of a quadratic equation are $\frac{-2+\sqrt{5}}{2}$ and $\frac{-2-\sqrt{5}}{2}$, write the equation in $ax^2 + bx + c = 0$ form.

sum $= \left(\frac{-2+\sqrt{5}}{2}\right) + \left(\frac{-2-\sqrt{5}}{2}\right) = \frac{-4}{2} = -2$

prod $= \left(\frac{-2+\sqrt{5}}{2}\right)\left(\frac{-2-\sqrt{5}}{2}\right) = \frac{4-5}{4} = -\frac{1}{4}$

$x^2 - (-2)x + \left(-\frac{1}{4}\right) = 0$

$x^2 + 2x - \frac{1}{4} = 0$

14) (a) Write a quadratic equation such that the sum of its roots is -5 and the product of its roots is 6.
(b) What are the roots of the equation you wrote in part (a)? [Show all work.]

a) $x^2 - (-5)x + 6 = 0$

$x^2 + 5x + 6 = 0$

b) $x^2 + 5x + 6 = 0$

$(x+2)(x+3)$

$x = -2 \quad | \quad x = -3$

15) Express in simplest form in terms of i: $\sqrt{-12}$

$i\sqrt{12}$

$\sqrt{4}\ \sqrt{3}$

$i2\sqrt{3}$

16) Express the given expression in terms of i. [*Assume all variables have a positive value.*]

$\sqrt{-2a^2b^5}$ → $i\sqrt{2a^2b^5}$

$i\sqrt{a^2b^4}\sqrt{2b}$

$iab^2\sqrt{2b}$

$ab^2i\sqrt{2b}$

Add

17) The sum of $3\sqrt{-8}$ and $4\sqrt{-50}$ is

A) $12\sqrt{-58}$ B) $26i\sqrt{2}$ C) $7i\sqrt{58}$ D) $7i\sqrt{2}$

$3\sqrt{-8}$

$3i\sqrt{8}$

$3i\sqrt{4}\sqrt{2}$

$3i2\sqrt{2}$

$6i\sqrt{2}$

$4\sqrt{-50}$

$4i\sqrt{50}$

$4i\sqrt{25}\sqrt{2}$

$4i5\sqrt{2}$

$20i\sqrt{2}$

$+$

$26i\sqrt{2}$

18) The expression i^{25} is equivalent to

A) $-i$ B) -1 C) i D) 1

$\frac{25}{4} = 6.25$

look here

$i^0 = 1$

$-i$ $i^{3\cdot.75}$ $i^{.5\cdot.25i^1}$ $= i$

i^2

-1

19) When simplified, $i^{27} + i^{34}$ is equal to

A) $i - 1$ B) $-i - 1$ C) i^{61} D) i

$\frac{27}{4} = 6.75$ → $-i$

$\frac{34}{4} = 8.5$ → -1

$-i - 1$

20) What is the sum of $5 - 3i$ and the conjugate of $3 + 2i$?

A) $2 - 5i$ B) $2 + 5i$ C) $8 + 5i$ D) $8 - 5i$

switch the sign in between → $3 - 2i$

$(5 - 3i) + (3 - 2i) = 8 - 5i$

21) Evaluate and simplify in $a+bi$ form: $(-4+i)-(6-i)$

$-4-6=-10$

$i-(-i)=2i$

$-10+2i$

22) What is the product of $(3-2i)$ and $(7+6i)$?

A) $21-12i$ B) $21+16i$ C) $9+4i$ D) $33+4i$

$(3-2i)(7+6i)$

$i^2=-1$

$21+18i-14i-12i^2$

$-12(-1)$

$21+4i+12$

$33+4i$

23) Simplify in $a+bi$ form: $(2+i)(3-6i)$

$i^2=-1$

$6-12i+3i-6i^2$

$-6(-1)$

$6-9i+6$

$12-9i$

24) What is the magnitude of the complex number $z=4-3i$?

A) 5 B) $\sqrt{7}$ C) 1 D) 25

$a+bi$

$|z|=\sqrt{4^2+3^2}$

$=\sqrt{16+9}$

$=\sqrt{25}$

$=5$

$|z|=\sqrt{a^2+b^2}$

25) Plot $-4+3i$ on the complex plane.